QUADRUPOLE MOMENTS OF WOBBLING EXCITATIONS IN ^{163}Lu*

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The wobbling motion is an excitation mode unique to a nucleus with stable triaxiality. While the nucleus favors the rotation about the axis with the largest moment of inertia, it can transfer a quantized amount of angular momentum to the other axes, resulting in a sequence of rotational bands built on the same intrinsic structure. The triaxial strongly deformed (TSD) bands of ^{163}Lu have been interpreted as wobbling-phonon excitations from the characteristic electromagnetic properties of the transitions connecting the bands [1].

Lifetimes of states in the TSD bands of ^{163}Lu have been measured with the Gammasphere spectrometer using the Doppler-shift attenuation method [2]. Quadrupole moments are extracted for the zero-phonon yrast band and, for the first time, for the one-phonon wobbling band. The values for the two bands show a striking similarity (see left part of the figure) and suggest that the bands are built on the same intrinsic structure. While the in-band quadrupole moments for the bands show a decrease towards higher spin, the ratio of the interband to the in-band transition strengths remains constant and does not follow the spin dependence expected from particle-rotor calculations [3] (see right part of the figure). We propose that the decrease in the in-band B(E2) and the constant interband B(E2) have the same physical origin and correspond to an increase in the triaxiality with spin, from $\gamma \approx 16^\circ$ to $\gamma \approx 22^\circ$, in qualitative agreement with cranking calculations, to which the experimental results are compared. The new results support the wobbling interpretation and give an experimental handle on the triaxiality parameter γ.

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